Treasury Committee that their very indefinite suggestion as to the space to be provided to meet present needs really referred to their view as to the maximum amount of space which a Science Museum should be allowed to cover. We are certain that the scientific members of that Committee would repudiate any such opinion, and they would quote, as we have quoted above, the actual facts concerning the Natural History Museum as negativing any such idea.

Finally, it is advisable to point out the terrible want of any sense of perspective on the part of the Legislature on matters relating to science and art. We do not object to any expenditure the Government may choose to make upon art, but it is our clear duty to point out that the interests of science must not be neglected in order that art may be encouraged. The £70,000 paid for the land which has given rise to all this discussion is the same sum as that given not long ago for a single picture. The "British Luxembourg"—whatever that may be—which the Government is supposed to be now fostering, was intended to contain most of the pictures now in the South Kensington Museum; so that the edifying spectacle was to have been, or indeed may yet be, seen, of emptying all the picture galleries at one end of the Museum while £400,000 of public money is being expended—this has been agreed to by the Government with alacrity—in building new picture galleries at the other. Nor is this all. The Tate Gallery, if built, is to be maintained by the Government: we are informed this will cost at least £4000 annually. Here, then, is another endowment of, say, £160,000 for art. We do not object to this if the nation so wills it; but is it wise that all this time the training of our science teachers—our great requisite just now—is to be carried on in sheds, and that the only concern that the Government shows in relation to the Science Museum, which is to include the Patent Museum, is to still absorb year after year the patent fees, which ought in justice to be used for the improvement of our national industries?

CHEMICAL TECHNOLOGY.

Manual of Chemical Technology. By Rudolf von Wagner. Translated and edited by William Crookes, F.R.S., from the thirteenth enlarged German edition, as remodelled by Dr. Ferdinand Fischer. With 596 Illustrations, 968 pages. (London: J. and A. Churchill, 1892.)

WHEN a book has reached a thirteenth edition, it may usually be assumed that its form and contents are so familiar to all who are likely to be interested in the subject of which it treats as to require no description, and that it has attained so substantial a reputation as to be independent alike of praise or blame flowing from the pen of the critic. In the case of the book before us, however, the author is no longer living; and having completed in 1880 the eleventh edition of his work, the care of future issues devolves upon others. There is probably no subject which changes so rapidly, owing to the advances of science and the incessant activity of inventors, as chemical technology, or the application of chemistry to useful purposes in the industrial arts; and a glance at the table of contents of such a book as this is sufficient to remind one of the vast range of subjects with which chemistry has to do. It is the extent and diversity of these subjects which suggests at once the idea of the difficulties which must attend the compilation of such a treatise even when the work of so distinguished a technologist as von Wagner is carried forward by editors so eminent as Dr. F. Fischer and Mr. Crookes. That they have discharged their duty in no perfunctory spirit is evident from the fact that many sections are entirely new, and that, as compared with the eleventh German edition, more than half the text and the illustrations have been replaced by new matter. And further, as pointed out by the English editor, a manual such as this must be in many respects adapted to the conditions of the country where it is written, and, if translated for use elsewhere, it requires modification. The prices of raw materials, of fuel, and of labour, and the laws in different countries have in each case their influence upon the conditions under which chemical industries are carried on. As already remarked, a book in its thirteenth edition must have been found useful by a good many people, but the first thought that passes through the mind in turning over the pages of Wagner's "Technology" is—For whom can this book have been intended? It treats of everything: of fuel and metallurgy, of water, acids, and alkalies, of pigments and dyes, of glass and cements, of food and fibres, of leather, soap, wood, matches, and many smaller subjects. In the limits of 950 pages it is not possible to provide all the details essential to each process which would be sought by a manufacturer, and an examination of the volume shows that the treatment of the successive subjects is very unequal. The impression derived from its perusal is that, on the whole, it is most likely to be useful to senior students or to chemists who wish for general information relating to chemical manufactures, but that the efforts which have evidently been made to incorporate into this new edition an account of modern processes are spasmodic, and not always successful.

The articles on soda and on chlorine, for example, are among the best in the book. The several processes for the recovery of sulphur from alkali waste, including the Schaffner-Helbig and the Chance patent processes, are described with some detail; and the Weldon-Péchiney process for obtaining chlorine from magnesium chloride is described at length with the aid of numerous illustrations. But even in this latter case, in view of the importance of the process, which is still on its trial, information more recent than December 1887, might have been expected. There is no reference to more recent processes for electrolyzing alkaline chlorides; but this, perhaps, is expecting too much in the way of the "latest intelligence"; and doubtless the same remark applies to the absence of any description of liquid chlorine as a commercial article. This, however, does not account for the curious error by which the number formerly given as the density of liquid chlorine, 1·33, is assigned to the gas. The admirable work of Knietsch (*Annalen*, 259) on the properties of liquid chlorine deserves to be had in remembrance, more especially as it was done in the laboratory of an alkali-works, with industrial objects in view.

A really unsatisfactory article is that which relates to

© 1892 Nature Publishing Group

iron and steel. The ores are stated to be roasted in heaps and in special kilns, but no description is given of the process. The blast-furnace to which the longest description is devoted is an open-top furnace of forty years ago. No figure is given of a modern English blast-furnace; the form shown in the cut, and dismissed in eight lines of text, is not to be seen in this country. The cup and cone charger, general in Great Britain, is not even mentioned. There is no straightforward account of the successive chemical changes which are supposed to take place as the charge descends in the furnace, but, without introduction, the reader is plunged into a disproportionately long discussion of the "heat conditions of the blast-furnace." There is no description of the *tuyères*, though it is mentioned that they are cooled by water, nor of the sand casting-bed, nor of the resulting pigs. In the account of "crude" iron, as it is called, it is surely not enough to say that, "according to the nature of the carbon, it is distinguished as white and grey crude iron," and then to give just six lines to each of these two varieties, without so much as mentioning the various grades distinguished by the numbers familiar in every ironworks, or the purposes in the forge or the foundry to which they are severally applicable. Following the description of "crude" iron is a section occupying about three-quarters of a page on the examination of iron and steel, which might as well have been omitted, as it is quite useless. The same inadequate treatment is noticeable throughout the article, and to an English reader it must appear strange that English metallurgists, with the exception of Bessemer, Thomas and Gilchrist, and Bell, whose name appears once, are generally ignored. This seems to be one of the articles in which the English editor has not been sufficiently careful to supply the modifications indicated in the preface as requisite in order to adapt the book to the conditions prevailing in this country.

Turning now to subjects of a different character, there is the vast field of coal-tar and the colours derived from the tar hydrocarbons. The colours are dealt with in sixty-seven pages. In comparison, therefore, with other subjects in the same volume, this important and interesting department of applied chemistry receives perhaps its fair share of space; but, recalling the fact that in another book on applied chemistry recently published nearly the same number of pages is devoted to naphthalene and its derivatives alone, it is obvious that considerable condensation must have been effected in the work before us. In connection with this article, every chemist who has any feeling for consistency in chemical nomenclature must protest against the playful variety of spelling which the editor permits in the names of the hydrocarbons. On the same pages we have paraff*ine*, benz*ol*, naphthal*ine*, anthrac*ene*, triphenyl meth*an*. This is really too bad!

Referring to the thirty pages devoted to dyeing and tissue-printing, we find a practical acknowledgment of the inadequacy of the treatment which many subjects receive by the insertion of a list of books to which the reader is referred for further information. And this recalls the fact that elsewhere throughout the volume references to authorities in the shape of original memoirs, books, or patent specifications are rarely given. This is an omission which might with great advantage be repaired in a future edition, not only because further information is often essential, but because there are, necessarily, scattered up and down the pages of such a comprehensive work as this a good many statements which require some qualification, or, at any rate, some positive evidence to make them completely acceptable, as well as others which are manifestly antiquated and obsolete. For example, the statements (p. 223) as to the influence of the addition of aluminium to iron and steel ought not to be put forward without proof. Certainly the fact that the manufacture of pure aluminium is now practically abandoned tends to show that it has not been found so valuable in connection with iron and steel as was at one time asserted.

There is no very pressing necessity for introducing photometry into a book on chemical technology; but if there is a reason for its introduction, there must be a still stronger reason for making the description practical. It is not so in this case, for while Bunsen's photometer is referred to, rather than described, in eight lines, Violle's attempt to utilize the light emitted from melted platinum as a photometric unit is described at length, with a figure, and the article concludes with the statement that the amyl acetate lamp will probably in time supersede the other units. We think not.

Manufacturers who have managed to keep the details of their plant and their processes practically secret must derive some amusement from books which profess to describe their manufactures. The successful English monopolists of phosphorus-making (Messrs. Albright and Wilson) are represented, no doubt correctly, as making more phosphorus than anybody else; but we can imagine the quiet smile with which they would regard the pictures of apparatus said to have been invented and employed by themselves, as well as such ridiculous statements as (p. 410) that "bone ash is now the only material used by phosphorus-makers," &c. If it were not for the lofty air of knowledge with which such things are described, it would not matter greatly; but it would be more candid towards the reader if the writer of such an article as that on phosphorus would begin by declaring roundly that he does not *know*, but only *imagines*, that the following is the process likely to be employed.

The difficulty of purifying the pages of successive editions of so large and complex a book of phraseology which is obsolete or inappropriate is illustrated on p. 398, where a brief exposition is given of the views entertained by "the late Dr. Gerhardt" concerning the constitution of fulminating mercury. Not a word is mentioned of more recent chemical discussions on the fulminates, though they have been renewed more than once in the five-and-thirty years which have elapsed since the death of the distinguished French chemist.

The editors have produced a volume which contains much entertaining and instructive reading. From what has been said, however, it is obvious that the reader must not expect to find the whole truth, and nothing but the truth, set forth in any such cyclopædic production. It is not possible for any one man, or any three men, to array, without mistake, the accumulated stores of human knowledge and experience in such a subject as applied chemistry.

W. A. T.

© 1892 Nature Publishing Group